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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/069,208	02/22/2002	Ken Kobayashi	07553.0028	7671

7590 05/19/2004

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EXAMINER

ALANKO, ANITA KAREN

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 05/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/069,208	Applicant(s) KOBAYASHI ET AL.	
	Examiner Anita K Alanko	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 3/29/04 RCE.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 10-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 10-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☒ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/29/04 has been entered.

Priority

Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Japan on 8/23/1999. It is noted, however, that the certified copy of the foreign priority document (from the International Bureau) JP 11-235191 has not been reconciled with the file. Examiner made a mistake when it was indicated in the first office action that the document had been received.

Claim Rejections - 35 USC § 112

Claims 10-27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 10, line 7 and claim 12, line 7, the term "smooth" is a relative term that renders the metes and bounds of the claims unclear. It may be simply deleted.

Claims 11 and 13-27 do not cure the indefiniteness of their base claim and are therefore also rejected.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 10-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Robb (US 4,529,860) in view of admitted prior art.

Robb discloses a method of etching an organic film (polyimide) on a workpiece (silicon substrate) (Example V, which incorporates Example I, col.6, lines 27-61 and col.4, lines 7+, respectively), the organic film having an etching mask (hard mask layer of silicon nitride or silicon oxide), the method comprising:

placing the workpiece in a hermetically sealed process chamber 38;

introducing processing gas comprising a gas comprising nitrogen atoms and a gas comprising hydrogen atoms into the process chamber ("mixed hydrogen-nitrogen plasma" or Example V); and

etching the organic film (the anisotropic etch of Example V).

Robb does not explicitly recite that the etch is stopped before the etching goes through the organic film. However, Robb does teach that the etch can be conducted to a "predetermined amount" (col.2, lines 52-54). Admitted prior art teaches that it is useful to stop the etch before the etch goes through the film (page 1, lines 25-28) It would have been obvious to one with ordinary skill in the art to stop the etch before the etching goes through the film in the method of

Robb because Robb teaches to etch a predetermined amount and admitted prior art teaches it is useful to etch part-way through the layer.

Robb does not explicitly disclose that microtrench is prevented, however the figures show that during etching to form a ditch, that micro trenches are substantially prevented since they are not shown (Fig.2-3). Further, since the same method steps are disclosed by Robb as in the instant invention, the same results of forming a bottom surface while preventing a micro trench are expected.

Further, as to claim 10, Robb discloses to etch at 150 mTorr (20 Pa, Example V), and also teaches that a range of up to 500mTorr (66.5 Pa, col.1, lines 26-28) is known. Robb also teaches that high pressure etching of polyimide is also known (col.1, lines 21-22). The relationship between pressure and etch rate is shown in Figure 5. Robb therefore teaches that the pressure is a result effective variable. It would have been obvious to one with ordinary skill in the art to etch at 500 mTorr or higher in the modified method of Robb because the pressure appears to reflect a result-effective variable which can be optimized. See MPEP 2144.05 IIB.

As to claims 11, 13-15, Robb discloses that the etch gas comprises nitrogen, hydrogen and argon (Example V and VI). It would have been obvious to one with ordinary skill in the art to add argon in the modified method of Robb because it is a conventional diluent for etch compositions as taught by Robb.

As to claim 12, it would have been obvious to one with ordinary skill in the art to etch at 500-800 mTorr in the modified method of Robb because the pressure appears to reflect a result-effective variable which can be optimized. See MPEP 2144.05 IIB

As to claims 16-27, admitted prior art (page 1, lines 25+) teaches that the damascene structure is a conventional structure. Wiring between levels conventionally includes forming contacts. It would have been obvious to apply the method of Robb to a damascene structure or a contact in the organic film because it is a conventional structure in microelectronics. Further, it would have been obvious to one with ordinary skill in the art to form the bottom surface of the ditch after stopping the etching, as this necessarily flows in the modified method of Robb.

Response to Amendment

Claims 10-27 are rejected under 35 U.S.C. 112, second paragraph. Claims 10-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Robb (US 4,529,860) in view of admitted prior art.

Response to Arguments

Applicant's arguments filed on 3/29/04 have been fully considered but they are not persuasive.

Applicant argues that Robb teaches away from the pressure range of the instant invention. Examiner acknowledges that this is not a preferred range, however Robb does disclose that the endpoint of the range (500 mTorr) is known and provides data in the graphs showing it (Fig.5).

Examiner acknowledges that it is unclear what the high pressure range in Robb encompasses.

Applicant argues that the pressure is not a result-effective variable. This is not persuasive because Robb discloses to vary the pressure -- Figure 5 shows that pressure is result-effective variable. Changing the pressure changes the etch rate.

Applicant argues that Robb does not attempt the same result as the applicant. However, all of the art applied, considered as a whole by one with ordinary skill in the art makes the claimed range obvious.

Applicant argues that the value of 498 mTorr when taken to one significant digit is not 500 mTorr. Note however that the reference teaches "about 66.5 Pa" which converts to about 498.8 mTorr, which is about 499 mTorr. Even if applicant's arguments are convincing, about 499 mTorr is about 500 mTorr. When considering experimental error, the two points overlap. At the very least, 499 mTorr suggests 500mTorr as obvious.

Admitted prior art teaches that stopping the etch before the etch goes through the film is known.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anita K Alanko whose telephone number is 571-272-1458. The examiner can normally be reached on Mon, Tues & Fri: 8:30 am-5 pm; Wed&Thurs: 10 am-2 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 1765

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Anita K. Alanko

Anita K Alanko
Primary Examiner
Art Unit 1765